CLAIMS

1. A thermodynamic cycle including a compressor, a first turbine downstream of the compressor, a heat exchanger located downstream of the first turbine and operable to reject heat from the cycle to another thermodynamic cycle, an evaporator downstream of the heat exchanger and a second turbine downstream of the evaporator and upstream of the compressor.

2. A thermodynamic cycle including a compressor, a condenser downstream of the compressor, a first turbine downstream of the condenser, an evaporator downstream of the first turbine and a second turbine downstream of the evaporator and upstream of the compressor.

3. The thermodynamic cycle of claim 2 further including a heat exchanger located between said first turbine and said evaporator, the heat exchanger operable to reject heat to another thermodynamic cycle.

4. The thermodynamic cycle of any one of claims 1 to 3, wherein at least one of the first turbine and second turbine includes:
a rotor chamber;
a rotor rotatable about a central axis within said rotor chamber;
at least one nozzle including a nozzle exit for applying a fluid a fluid supply in the thermodynamic cycle to said rotor to thereby drive said rotor and generate power;
at least one exhaust aperture to, in use, exhaust said fluid from said turbine;
wherein the flow of said fluid from said at least one nozzle exit is periodically interrupted by at least one flow interrupter means, thereby raising the pressure of said fluid inside said at least one nozzle.

5. The thermodynamic cycle of claim 4, wherein the at least one of the first turbine and second turbine includes at least one fluid storage means between said fluid supply and said at least one nozzle.

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6. The thermodynamic cycle of claim 5, wherein said fluid storage means has a capacity at least equal to a displacement of the compressor.

7. The thermodynamic cycle of any one of claims 4 to 6, wherein said at least one flow interrupter means substantially stops the flow of said fluid from said at least one nozzle exit until the pressure inside said at least one nozzle rises to a preselected minimum pressure, which is less than or equal to the pressure of the fluid supply.

8. The thermodynamic cycle of any one of claims 4 to 7, wherein in use, said flow of said fluid from said at least one nozzle is interrupted by said at least one interrupter means for a period sufficient to bring said fluid immediately upstream of said at least one outer nozzle substantially to rest.

9. The thermodynamic cycle of any one of claims 4 to 8, wherein said rotor has a plurality of channels shaped, positioned and dimensioned to provide a turning moment about said central axis when refrigerant from said at least one nozzle enters said channels.

10. The thermodynamic cycle of any one of claims 4 to 9, wherein said rotor is has a plurality of blades shaped, positioned and dimensioned to provide a turning moment about said central axis when refrigerant from said at least one nozzle contacts said blades.

11. The thermodynamic cycle of any one of claims 4 to 10, wherein said at least one flow interrupter means includes at least one vane connectable to and moveable with an outer periphery of said rotor and adapted to interrupt the flow of said fluid out of said at least one outer nozzle exit when said at least one vane is substantially adjacent said at least one nozzle exit.

12. The thermodynamic cycle of claim 11, wherein said flow interrupter means includes a plurality of said vanes substantially evenly spaced apart around said outer periphery of said rotor.

13. The turbine of any one of claims 4 to 12, wherein said at least one nozzle in use supplies said fluid to said rotor at a sonic or supersonic velocity.

14. The thermodynamic cycle of claim 13, wherein said at least one exhaust aperture includes diffuser and expander sections to decrease the velocity of said fluid and maintain the pressure of the fluid flow once it has decelerated to a subsonic velocity.

15. The thermodynamic cycle of any one of claims 1 to 14, wherein at least one of the first and second turbines includes a rotor including two or more spaced apart rotor windings and a stator including a plurality of stator windings about said rotor, wherein at least two of said stator windings are connected to a controllable current source, each controllable current source operable to energise the stator windings to which it is connected.

16. The thermodynamic cycle of claim 15, wherein each controllable current source is operable to energise the stator windings to which it is connected after the rotor has reached a predetermined velocity.

17. The thermodynamic cycle of claim 16, wherein the predetermined velocity is the terminal velocity for the current operating conditions of the turbine.

18. The thermodynamic cycle of any one of claims 15 to 17, wherein each current source increases or decreases the current through their respective stator windings dependent on a measure of the power output from the stator windings.

19. A method of control for the thermodynamic cycle claimed in any one of claims 15 to 18 including repeatedly measuring the power output from the stator windings and increasing the current through the windings if the current measure of power output is greater than a previous measure of power output and decreasing the current through the windings if the current measure of power output is less than a previous measure of power output.

20. A method of generating power from a thermodynamic cycle including a compressor, a first turbine downstream of the compressor, a heat exchanger located downstream of the first turbine and operable to reject heat from the cycle to another thermodynamic cycle, an evaporator downstream of the heat exchanger and a second turbine downstream of the evaporator and upstream of the compressor, wherein the first second turbines include a rotor and at least one nozzle to apply fluid to the rotor to thereby drive said rotor and generate power;
the method including providing at least one flow interrupter means to periodically interrupt the flow of said fluid out of said at least one nozzle, thereby raising the pressure of said fluid inside said at least one nozzle to a preselected minimum pressure which is less or equal to said fluid supply means pressure before resuming the flow of said fluid out of said at least one nozzle.

21. A method of generating power from a thermodynamic cycle including a compressor, a condenser downstream of the compressor, a first turbine downstream of the condenser, an evaporator downstream of the first turbine and a second turbine downstream of the evaporator and upstream of the compressor wherein the first second turbines include a rotor and at least one nozzle to apply fluid to the rotor to thereby drive said rotor and generate power;
the method including providing at least one flow interrupter means to periodically interrupt the flow of said fluid out of said at least one nozzle, thereby raising the pressure of said fluid inside said at least one nozzle to a preselected minimum pressure which is less or equal to said fluid supply means pressure before resuming the flow of said fluid out of said at least one nozzle.

22. The method of claim 20 or claim 21, wherein said preselected minimum pressure is sufficient to cause the fluid to reach the local sonic velocity at a throat of the nozzle.

23. The method of claim 22, including accelerating fluid exiting said at least

one nozzle to supersonic velocities.

24. A control system for the thermodynamic cycle claimed in any one of claims 1 to 18, the control system including:
sensing means for providing a measure of an output of the thermodynamic cycle;
control means for the compressor, wherein the control means is in communication with said sensing means to receive as inputs said measure of an output of the thermodynamic cycle and a measure of the work input of the compressor;
wherein the control means is operable to compute a measure of efficiency from said inputs and vary the speed of the compressor to maximise said measure of efficiency or to maintain said measure of efficiency at a predetermined level.

25. The control system of claim 24, further including second control means for the second turbine and sensing means for providing a measure of the temperature of a controlled area, wherein the second control means receives as a further input said measure of the temperature of a controlled area, and is operable to open or close the fluid flow path through said second turbine in response to sensed variations in temperature in the controlled area in relation to a target measure.

26. The control system of claim 24 or claim 25, wherein the second control means further receives as an input a measure indicative of the amount of refrigerant in the cycle which is vaporised after an evaporation phase in the cycle and to open or close the fluid flow path through said second turbine to maintain vaporised refrigerant after the evaporation phase.

27. The control system of any one of claims 24 to 26, wherein the operation of the second control means to maintain vaporised refrigerant after the evaporation phase is performed after a predetermined delay from the control means opening or closing the fluid flow path through said second turbine in response to said sensed variations of temperature.

28. The control system of any one of claims 24 to 27 including third control means for a condenser in the thermodynamic cycle, the control system varying the operation of the condenser to maintain a required level of cooling of refrigerant by the condenser.

29. The control system of claim 28, wherein the control means, second control means and third control means is a single microcontroller or microprocessor or a plurality of microcontrollers or microprocessors with at least selected microcontrollers or microprocessors in communication with each other to allow management of the timing of the functions of the control system.

30. A control system for the thermodynamic cycle claimed in any one of claims 15 to 17, the control system including:
sensing means for providing a measure of an output of the thermodynamic cycle;
control means for the compressor, wherein the control means is in communication with said sensing means to receive as inputs said measure of an output of the thermodynamic cycle and a measure of the work input of the compressor;
wherein the control means is operable to compute a measure of efficiency from said inputs and vary the speed of the compressor to maximise said measure of efficiency or to maintain said measure of efficiency at a predetermined level and wherein the control system is operable to control the direct current through the stator windings of said turbine.

31. The control system of claim 30, operable control the direct current through the stator windings to dynamically maintain the balance of said turbine when loaded.